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COMPLETE SPECIFICATION.

Improvements in or relating to a Device for Automatically Effecting Injections with a Hypodermic Syringe.

I, DONALD TRAVERS LEWIS, a British Subject, of Port Lincoln, State of South Australia, Commonwealth of Australia, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a device for automatically effecting injections with a hypodermic syringe.

When using hypodermic syringes it is necessary to insert the needle into the patient for the required distance and then discharge the contents of the syringe through the needle, and when this operation is done by hand there is a large number of variables which are most undesirable and which are difficult to control. Firstly, it is found that pain is experienced and there is a tendency for the flesh surrounding the point of injection to swell unduly and remain sore for some hours after the injection is given if the needle is injected slowly, secondly it becomes necessary in many cases to accurately gauge the depth to which the needle will enter the flesh.

It will be seen that these two problems are difficult to solve under any circumstances, but when circumstances arise that a patient is required to give himself an injection it becomes quite difficult to control them to any appreciable extent and the patient is frequently subjected to a great deal of unnecessary discomfort.

There are also other problems which it is the object of this invention to overcome and these include the desirability of com-

pleting an injection as quickly as possible and yet not forcing the injected liquid into the body at a harmful rate.

Various proposals have been made to reduce or overcome some of the above-mentioned faults with the injection system as at the present practised and it is known that certain proposals have been made whereby a hypodermic syringe may pierce the flesh under the action of a spring. However, there are certain problems which are known to still exist, and among these is the problem that occasionally a needle may be thrown from the end of the body of the syringe, and further that the previously proposed units are not always convenient to use.

In brief the invention may be said to consist of a device comprising a housing, a syringe carrier slideable in said housing, means on the carrier to axially confine a syringe in the carrier with its needle projecting forwardly and its plunger projecting rearwardly of the carrier, a pressure rod slideable in the housing and releasably engaging the carrier, spring means between the housing and the carrier to load the carrier forwardly through the pressure rod, a releasable trigger to hold the carrier back, release means on the housing to release the pressure rod from the carrier after the first part of the forward movement of the pressure rod, and an actuating rod on the pressure rod to strike the syringe plunger and move the plunger forward during the continued movement of the pressure rod.

While it will be understood that constructional variations could be introduced which would still lie within the scope of the invention, an embodiment of the invention will

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be described with reference to the accompanying drawings in which:—

Fig. 1 is a perspective view of a device; Fig. 2 is a longitudinal section to a slightly reduced scale, showing a syringe loaded in the device, and the device in its cocked position;

Fig. 3 is a view with the lid open, but without the syringe, and with the device in a normal position; and

Fig. 4 is a section on lines 4—4 of Fig. 1.

The injecting device 1 is made with a pistol grip 2, a release trigger 3, and a housing 4 of sheet metal. A syringe carrier 5 is constructed so that the syringe 6 is supported at its front in a slot 7 which supports the nose or boss of the needle 8, and it is supported at its rear end in a second slot 9 which fits over the plunger 10. The slot 9 is in a slotted bracket 11 which is adjustably secured to the carrier 5 by the screw threaded members 12, which at the same time serve to slidably retain the carrier 5 to the housing 4.

5 A pressure rod 14, which may be of any suitable material, say three sixteenths inch diameter brass, extends for the full length of the housing 4, terminating just behind the front face at its front end 15 and projecting through the rear end of the housing 4 by a short distance and terminating in a bridge member 16 which enables it to be cocked by hand. The bridge member 16 also carries an actuating rod 17, the actuating rod 35 17 being made co-axial with the injection syringe 6.

The top surface of the syringe carrier 5 has an upwardly formed member 18 with a hole 19 therein through which the pressure rod 14 projects. This member 18 is situated a predetermined distance back from the front of the syringe carrier 5 so that the distance between the front of the syringe carrier 5 and the front end 15 of the member 14 is approximately the length of stroke of the syringe plunger 10 when the device 1 is cocked.

The pressure rod 14 has a slot 21 cut in the top of its front end to engage a downwardly formed part of the latch member 22 which is urged into the slot 21 by the leaf spring 23, when pressure rod 14 and the syringe carrier 5 are drawn rearwardly. A projection 24, preferably in the form of a screw as shown in Fig. 3 engages the front end of the carrier 5 so that the unit may be cocked by moving the bridge member 16 rearwardly.

60 A slot 25 in the lower wall of the syringe carrier 5 co-operates with a seat 26 which is urged upwardly by means of a seat spring (not shown) when the carrier 5 is withdrawn the desired amount. The trigger 3 is held outwardly by spring 27, but when actuated 65 releases the seat 26 from the syringe car-

rier 5 so that a spring 29 around the pressure rod 14 urges pressure rod 14 forwardly at a high speed, this in turn urging the carrier 5 forwardly, thus moving the needle 8 through the aperture 30 in the housing 4 so that it may penetrate into the flesh, and when the carrier 5 terminates its forward motion the pressure rod 14 is released from the hole 19 in the member 18 on the syringe carrier 5 by engagement of the latch member 22 against a release ramp 32 on the inside of the housing 4, and then the actuating rod 17, which is on the pressure rod 14 because of the bridge member 16, will push the syringe plunger 10 downwardly to inject the contents. An adjusting member 33 is provided with a flange 34 arranged to contact the outside of the housing 4 to adjust the furthest point of travel of the carrier 5 and thereby adjust the depth of penetration of the needle 8.

A lid 35 is fitted to the side of the housing 4 to obscure the syringe 6, this feature having a strong psychological effect particularly on children who might otherwise be afraid of injections. The spring member 36 retains the syringe 6 in the carrier 5 when the lid 35 is closed.

65 It will be seen from this description that the carrier 5 is loaded in a forward direction by the spring 29 acting through the pressure rod 14. It will further be seen that the device 1 may be cocked by a single movement and that the contents of the syringe 6 will not commence to be expelled until the needle 8 has finished or almost finished its forward movement.

WHAT I CLAIM IS:—

1. For automatically effecting injections, a housing, a syringe carrier slidably in said housing, means on the carrier to axially confine a syringe in the carrier with its needle projecting forwardly and its plunger projecting rearwardly of the carrier, a pressure rod slidable in the housing and releasably engaging the carrier, spring means between the housing and the carrier to load the carrier forwardly through the pressure rod, a releasable trigger to hold the carrier back, release means on the housing to release the pressure rod from the carrier after the first part of the forward movement of the pressure rod, and an actuating rod on the pressure rod to strike the syringe plunger and move the plunger forward during the continued movement of the pressure rod.

2. For automatically effecting injections, a device according to Claim 1 wherein said spring means comprise a spring around the pressure rod.

3. For automatically effecting injections, a device according to either Claim 1 or Claim 2 wherein the pressure rod engages a latch on said syringe carrier, said latch

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being released by said release means on the housing after the first part of the forward movement of the pressure rod.

4. For automatically effecting injections, a device according to Claim 3 wherein the latch on the carrier engages a transverse slot in the pressure rod near the front end of the pressure rod, and said release means on the housing releases the latch from engagement of the transverse slot after the first part of the forward movement of the pressure rod.

5. For automatically effecting injections, a device according to any one of Claims 2 to 4 wherein said release means on the housing comprises a ramp on the housing engageable by the latch member to thereby release the latch member from the pressure rod after the first part of the forward movement of the pressure rod.

6. For automatically effecting injections, a device according to any one of the preceding claims wherein the front end of the carrier includes a slot, and the rear end 25 of the carrier has a slotted bracket secured thereto, whereby a syringe can be axially confined in the carrier with the needle of the syringe projecting forwardly through the slot and the plunger of the syringe projecting rearwardly through the slotted bracket,

the location of the bracket being adjustable on the carrier to allow the carrier to axially confine syringes of different lengths.

7. For automatically effecting injections, a device according to any one of the preceding claims wherein the housing is of sheet metal with a hinged lid and a pistol grip.

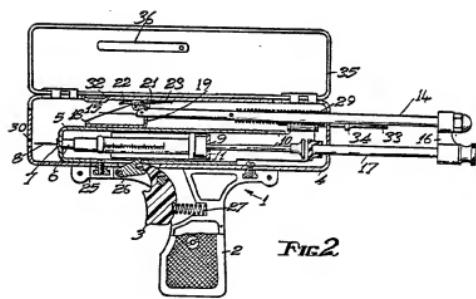
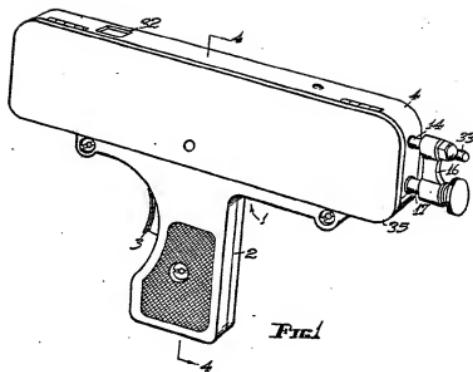
8. For automatically effecting injections, a device according to Claim 7 wherein the releasable trigger to hold the carrier back is disposed within the pistol grip.

9. For automatically effecting injections, a device according to any one of the preceding claims wherein an adjustable member on the syringe carrier passes through an aperture in the rear of the housing, a flange on the adjustable member being arranged to strike the housing and thereby limit forward movement of said carrier.

10. For automatically effecting injections, a device according to the embodiment described in the Specification with reference to and as illustrated in the accompanying drawings.

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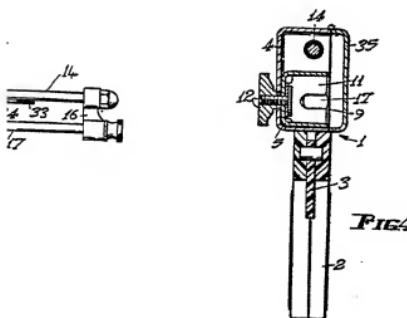
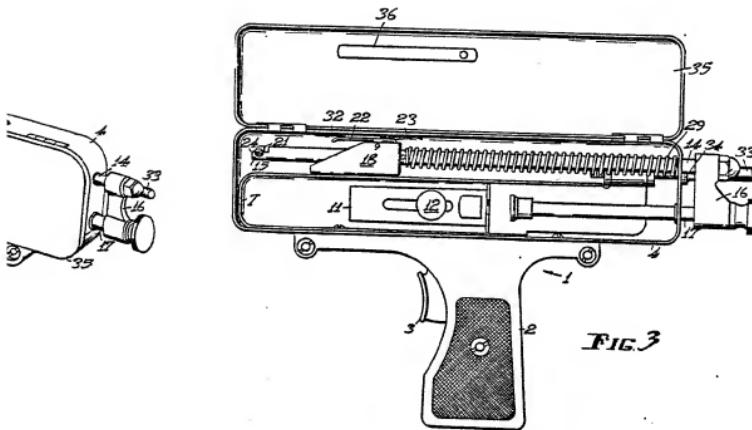


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COMPLETE SPECIFICATION

2 SHEETS

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Sheets 1 & 2*



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